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## PATENT ABSTRACTS OF JAPAN

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(21)Application number : 01-047631 (71)Applicant : MATSUSHITA ELECTRIC IND  
CO LTD

(22)Date of filing : 28.02.1989 (72)Inventor : KAWASAKI OSAMU  
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### (54) PLANE TYPE ULTRASONIC ACTUATOR

#### (57)Abstract:

PURPOSE: To decrease the vibration loss by fixing beam-shaped vibrators near the flexural vibration nodes of plane vibrators and generating transverse vibration of the free ends thereof and at the same time vertical vibration by longitudinal vibration with both the ends free.

CONSTITUTION: A plurality of beam-shaped vibrators 102, which are arranged in matrix form, are fixed near the flexural vibration nodes of plane vibrators 101 at the center thereof. The resonance frequency (f) of longitudinal vibration of the vibrators 102 and that of flexural vibration of the vibrators 101 are regulated to approximately the same value. When alternating voltage of frequency of about (f) is applied to piezoelectric bodies which construct the vibrators 101, the tips of the vibrators 102 are displaced transversely by flexural vibration of the vibrators 101. When alternating voltage of frequency of about (f) is applied to piezoelectric bodies which construct the vibrators 102, the vibrators 102 are displaced vertically and vibrates longitudinally. When the piezoelectric bodies are driven by

